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From Giffard to the Skycats - the Return of the Airship

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Throughout history, there have been three primary types of airship construction. According to their structure, they are known as non-rigids or blimps, semirigids, and rigids. They all share four basic sections. The first of those is the balloon, which is in the shape of a cigar. The balloon is what provides the lifting force of the airship and is filled with a lighter-than-air gas. Then there is the car, or the gondola. The car is suspended under the balloon and serves for the purpose of

accommodating the passengers and cargo. All airships also have engines that drive propellers, and they have horizontal and vertical rudders for steering the airship. The first type of airship, the nonrigid, is just that - a non-rigid balloon with a car attached under it by cables. The shortcomings related to this structure have to do with the fact that when and if enough gas leaks, the balloon simply collapses. The main difference between the so-called semirigid construction and the non-rigid one is a metal frame. The frame in the semirigid extends along the balloon, thus holding it in shape and providing solid support for holding the car underneath. The rigid construction is a light structure of aluminum-alloy girders dressed in a fabric material. Instead of one big balloon, the rigid construction holds several smaller balloons, each of which can be filled with gas or emptied separately. The rigid construction maintains the shape of the balloon regardless of whether it is full of gas or not.

Conventionally, the lighter-than-air gases used in the balloons of airships are hydrogen and helium. The lightest gas, hydrogen possesses the greatest lifting power. Its disadvantage when applied to airships is that it is highly flammable. This makes it dangerous and has indeed been the reason for numerous deadly airship misfortunes. Helium, on the other hand, although not as light and not having such lifting power, is preferable for safety reasons. In fact, helium completely eliminates the flammability risk, as it does not burn.

The Beginning: The First Airships

In 1852, Henri Giffard of France made the first ever successful airship flight. The airship he made for this historical attempt had the modest 3 horsepower engine, which weighed some 160 kilograms. This provided enough power to ensure the large propeller attached would turn 110 times per minute. The balloon he used was a 44m long bag, which he filled with hydrogen. Giffard's first official flight was made from the Paris Hippodrome. His average speed was about 10 km per hour and the distance he covered was some 30 km - a real achievement for the time.

Twenty years later, in 1872, Paul Haenlein, an engineer from Germany, was the first to apply an internal-combustion engine to an airship. A decade after this, in 1883, Albert and Gaston Tissandier from France were the first to apply an electric motor to an airship. Not much later, further advancements saw the production of the first rigid airship. It was made in Germany in 1897 with an aluminum-sheeting hull.

Ferdinand von Zeppelin

In the history of airships, one name stands out - Ferdinand, Count von Zeppelin, of Germany. Zeppelin was the most accomplished pilot of rigid airships. He constructed his first airship, the LZ-1, in 1900. For its time, this was a superior construction, 128 metres long and 11.6 metres in diameter. Its aluminum frame consisted of 24 longitudinal girders, set within 16 transverse rings. The airship was driven by two advanced 16-horsepower engines. It could reach record velocity of 32 km per hour. Zeppelin went on to making more reliable and sophisticated constructions, many of which were used in military operations throughout World War I. These airships became known as zeppelins.

In the post-war years of the 1920s and 1930s, the evolution of airship design experienced new heights in Europe and America. A new long-flight record was set with a round-trip crossing in July 1919 of the Atlantic Ocean. This was a British airship - a dirigible named the R-34. In 1926, an Italian airship of semirigid construction toured successfully the North Pole. Onboard were famous explorers Roald Amundsen, Lincoln Ellsworth, and General Umberto Nobile. Soon after, in 1928 one of Zeppelin's successors, Hugo Eckener of Germany, completed the Graf Zeppelin airship. Graf Zeppelin was destined to complete 590 flights, out of which 144 were ocean crossings.

Despite these rapid achievements, airships were virtually abandoned in the late 1930s because of their cost, their slow speed compared to airplanes, and their weakness in turbulent weather conditions. Their unpopularity was also increased due to a number of frequent failures and due to the fast evolution of airplane construction in the 1930s and 1940s.

The return of the Airship - the Skycat

Some six decades after the aviation world saw the airship an obsolete vehicle, a revolutionary aircraft has been designed that has been declared to have ability to bring about the return of the airship. This new lighter-than-air craft has been called the SkyCat.

The SkyCat is revolutionary in its capacity to bring together the benefits of lighter-than-air and those of havier-than-air craft technology. It uses helium for lifting power but the lift is aerodynamic due to its hull shape, which resembles an aircraft. Thus the SkyCat is supposedly bringing the best features of both aircraft and airship construction for its unique purposes. The result is a craft of outstanding

usefulness and staying power.

The SkyCat is equipped with a distinctive hover-cushion landing system, which is extended on landing and withdrawn in flight. This unique system eliminates the need for specially prepared airport-like landing surface. In fact, the SkyCat can easily land on land, water, desert, or snow. When on land, extra stability is provided by turning the hover-cushion engines around. Thus the airship is essentially sucking down, almost forming a vacuum and is able to stay stable in place without handling equipment.

The SkyCat is being developed in Cardington, UK, in three basic models. Their main difference is in the lift-size variation, the smallest with 20 tons, the middle one with 220 tons and largest one with a lift-size of 1000 tons. Apart from this, the three models are of the same construction. They are fully operable in all weather conditions open to a standard civil aircraft. According to their size, each of the models is ideal for its specific purposes. However, all the Skycats have the same benefits due to their overall identical figure.

The question of speed - Skycats vs. Aircraft

It is more than natural for anyone who reads this to ask himself about the speed of the SkyCats. After all, this is of crucial importance in today's fast-paced world. If SkyCats are faster, are they to replace aircraft. The answer to this question is not a simple one, as several factors must come into consideration. To begin with, if we look at speed as an absolute measurement, then airplanes remain the faster alternative. However, this answer has a problem due to its failure to put speed into context. It certainly misses out on essential effects that act together to produce overall deployment speed. As a point in case, airplanes fly at speeds of some 1000 kilometres per hour - more than 5 times faster than the 160+ kilometers per hour at which SkyCats can fly. However, this does not mean that airplanes are capable of faster deployment speeds, because of their dependency on infrastructure and fuel. Therefore, although airplanes fly so much faster than airships, for all but the longest-distance deployments, the SkyCat actually is capable of faster deployment speeds, thus providing a competitive alternative to conventional aircraft.

Benefits

The 220-ton-lift SkyCat model, called the SkyShuttle, can serve as an

inexpensive means of mass passenger transportation. It can be ideal for short routes, with capacity for up to 900 passengers at a cost per passenger/km of less than half a dirham. If fitted with more spacious all-1st-Class seating, the SkyCat-220 could accommodate 420 passengers on the lower deck and will have enough space for 42 cars on the upper deck car park.

The smaller, 20-ton-lift airship - the SkyCat 20 - has capacity for up to 120 passengers in economy-class seating, or 70 passengers in spacious first-class accommodation. It offers direct operating costs of less than AED3,600/hr, which comes up to about AED 36 per economy-class passenger per hour, or around AED 0.25 per passenger/km. The SkyCat will be able to land just next to a cruise liner, for instance. In addition, the SkyCat can fly passengers from the shore straight to places deep inland and maneuver adaptably from the mainland to the islands. As an added potential tourist benefit, it can hover above notable sites and hang around over awe-inspiring terrains for hours and days on end without polluting the environment.

In addition to transporting people and for fast deployment, the SkyCat can be used for other purposes such as for telecommunications and advertising. Hovering in one position at 3000 metres and set up with sophisticated transmission gear, a SkyCat 20 can be an on-demand, rapidly-deployed and very commercially viable telecommunications station for beaming out broadband, broadcast and 3G mobile wireless networks signals.

When it comes to advertising potential, the SkyCat-20 can also become a low-cost large display hovering over downtown districts and offering a ground-breaking line of advertising. For extraordinary impact, the SkyCat can be fitted with two huge plasma display screens of 26m x 14m. The size will be longer than a Boeing 747. These screens can play full colour advertising video clips and even movies. They will be well visible during the day, but their impact will be unprecedented during the night.

So, when will we see the first SkyCats? There is talk of a formal introduction with a grand World Tour, planned for 2005. The producers claim the SkyCat will generate an incomparable impression wherever it flies. Indeed, plans are being made for a global scale unique launch with the SkyCats flying over 55 major international cities and over big sporting venues. Over a period of six months, the launch campaign will cover over 100,000 km.

Is the SkyCat set for a dazzling future? For one, it will without a doubt transform

the image of the somewhat forgotten airships. It is certainly having notable advantages over aircraft for its large payload, long range and high endurance. Its low capital and operating costs, its supposedly high safety levels, and high fuel efficiency make it even more competitive. Its potential for a broad range of functions such as tourism, disaster relief, border surveillance, and bulk transport of produce, paint a bright picture of opportunity and expectations. A century and a half after Henri Giffard's invention, the history of the airship is about to be rekindled with the arrival of a SkyCat.

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